Lightbot

Creating and Running a Program

Main Goal: Understand how to create and give a computer a set of instructions to follow.

Overview

Students play the initial set of “Basic” levels in Lightbot. They will learn how to tell a computer what to do with a series of basic commands and gain the general process by which computer programs are written.

Objectives

Students will learn how to

1) **Plan** out a series of instructions
2) **Write a Program**, and have Lightbot run through the instructions
3) **Test** if the end result was correct (all the blue tiles were lit)
4) **Debug** If the result was not correct, walk through what happened, find the mistake, and modify the program

Materials

Lightbot game (on computer or iOS or Android device)

Whiteboard/chalkboard/projector

Preparation

Make sure that Lightbot runs on the selected device(s) before class starts:

Web
Computers will need Flash Player installed when running the game at light-bot.com/hocflash.html

iOS or Android
The Lightbot app should be pre installed on the class devices

Play the initial 3 levels following the in-game instructions to understand how students need to solve puzzles

Introduction

Computers are amazing things. They are these devices which enable us to do so many things: play games, explore the internet, make art and create music. They're exceptionally good at doing really complex tasks, but they have to be programmed, or told, how to do those tasks first.

Programming is how we, as programmers, can tell a computer what to do. A computer does not understand regular English. We cannot simply program a computer by telling it to "walk the dog" or "do my homework". Computers understand only a small set of instructions. What our job is, as programmers, is to tell the computer how to use the instructions it knows, to solve a problem we have.

Exercise

Today, we are going to be playing a puzzle game called Lightbot. In Lightbot, there is a robot and he lives in a world of square tiles. The goal in each level is for Lightbot to light up all the blue tiles in the level. However, Lightbot *does not* understand something as complicated as saying "light all the blue tiles". Instead, he *does* understand a basic set of rules. Display the following to students.

⇧ An arrow icon tells Lightbot to move forward one space.

💡 A lightbulb icon tells Lightbot to light up the tile he is standing on

You are all going to play Lightbot and try to beat the "Basics" level set. To control Lightbot you need to give him a set of instructions, called a 'program', to run. Once you press the green play button, Lightbot will perform all the instructions in the program one at a time. If he makes a mistake, you will then have to tell Lightbot to go back to the start, and afterwards, change the program to give the correct instructions.

Lightbot knows a few more instructions which will be introduced to you as you complete more levels.

Optional Hints for Students

Don't be discouraged if your program is not correct on your first try. Simply read each instruction you gave Lightbot carefully and imagine how he would and should act at each step.

We are going to use the "Ask three, then me" rule. If you are really stuck, ask three other students for help before asking me for help. Explain your program step by step to a classmate, and see if they can spot a mistake. Programming in the real world is a collaborative effort - it is normal to give each other hints on how to solve puzzles.

Optional Questions following Exercise

1) How would you explain, in words, what the turn and jump instructions do (precisely)?
2) How did you come up with a solution to a new level (All in one go? A step at a time?)
3) If Lightbot did not do what you wanted, how did you find the mistake and fix it?